

Depth Document

Milind Diwan

What where who

- Depth document: document to clarify and justify the choice of depth for a large detector.
- Point: Need justification to start critical geotechnical work. Very important to make firm plans and reduce contingency and speed up schedule.

Document status

- <http://nwg.phy.bnl.gov/DDRD/cgi-bin/private/ProcessDocumentAdd>
- DDRD-doc-34: Report on the Depth Requirements for a Massive Detector at Homestake
- Document has all sections in draft form.
- Needs a lot of editing.
- Some Key Decisions Needed

Document Strategy

- Each physics subject discussed for depth justification.
- Brief survey of available levels at Homestake with pros and cons.
- Ancillary information: basic information about the workings of the water and liquid argon detectors. Brief descriptions of the science topics.
- Procedural description of the cavity stability and engineering study. (not detailed).

Physics

Topic	authors	comment
accelerator nu	diwan/rameika	W: need $\sim 1000\text{ft}$ for $S/B = 1$ Ar: shallower possible, but needs study of DAQ.
nucleon decay	Kearns	Has justification for a 40 m detector. Needs some scaling laws. K-neu mode needs 3km
solar nus	Klein	4850 makes the day/night measurement background free
supernova	Scholberg	>3500 ft will extend SN reach to much larger distances with low backgrounds.
relic SN	Smy	4km.w.e. will allow one to bring e-threshold down to the minimum possible $\sim 10\text{MeV}$

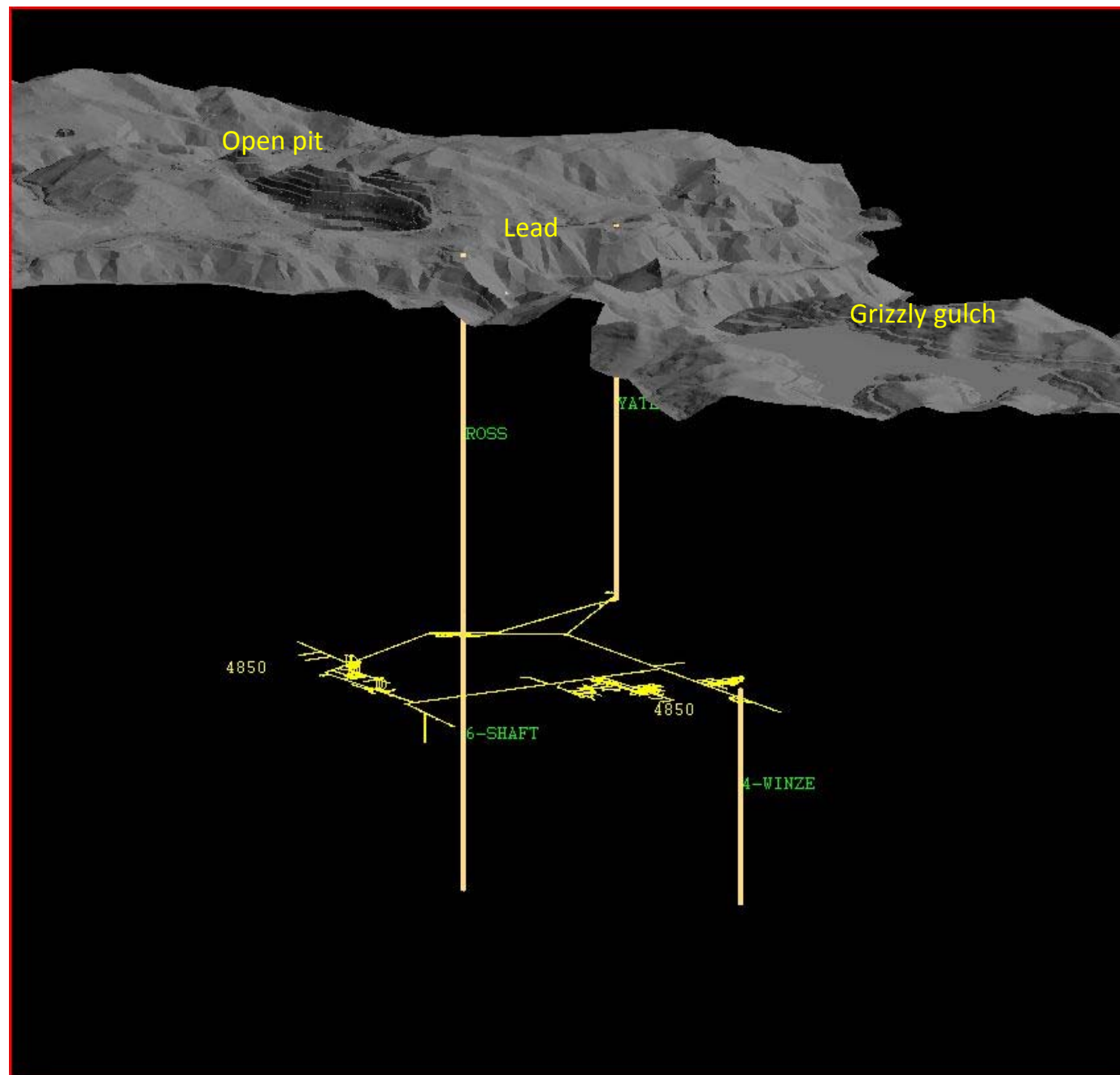
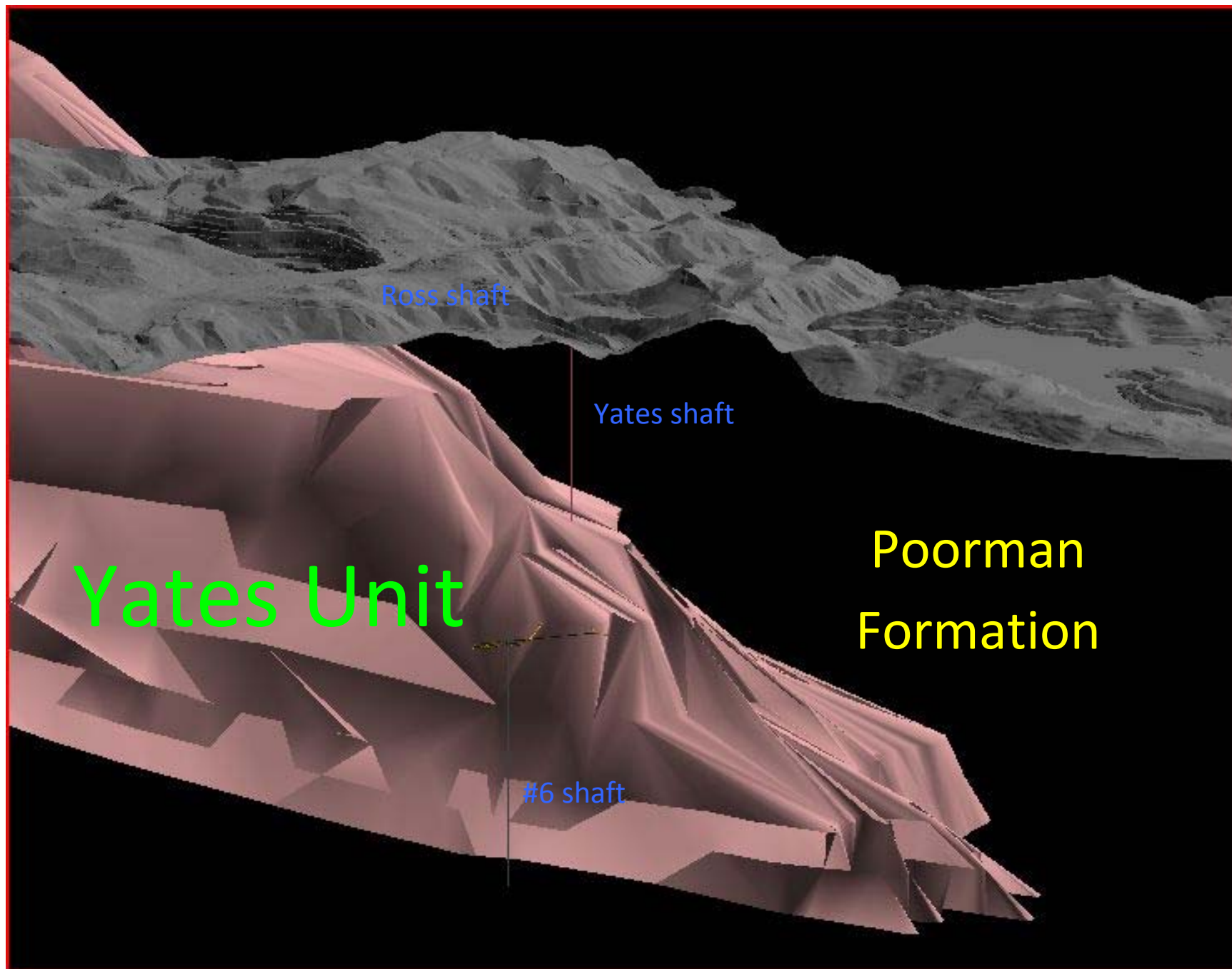


FIG. 10 (continued) - 3D view of the mine showing the relationship between the surface and underground features. The surface features include the Open pit, Lead, and Grizzly gulch. The underground features include the ROSS and WATKINS shafts, the 6-SHAFT, and the 4-WINZE shaft. The 4850 level is also indicated.



Level	Ross Skip Pocket	Yates Skip Pocket	Notes
300 800 1700			Does not connect to Yates
1850 2300 2600	Probably Active	Probably Active	
2750 2900 3050			
3200 3350 3500	Probably Active		
3650 3800 3950	Active		Does not connect to Yates
4100 4850	Active	Probably Active Active	

TABLE V: Possible Levels in the Homestake Mine for development of a megaton scale detector cavity. A skip pocket is a structure near the shafts that allow a skip to be loaded from that level. Without a skip pocket, removal of rock from the level using the shafts is not possible.

2. Homestake Formation: between brown and blue

2. Brown Formation: between blue and purple (Yates)

Practical issues

- Yates is the preferred choice.
- Geotechnical work at a deeper level is considered better applicable to shallower levels. But this needs careful thought: not generally applicable everywhere.
- The only work we can discuss so far is the work done in 2001 by Tesarik, et al. We need to rely on this, yet we also need to summarize what is next (with help from the geotechnical committee)

Timescale

- After this meeting !
- Hopefully by the end of month.